

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Electronic Devices & Circuits [CS-221]
Branch-CS

Time: 3:00 Hrs

Max Marks 70

Note: (i) Attempt any five questions.

(ii) Answer should be precise & to be point only.

(iii) Assume suitable data if necessary & state them clearly

- Q.1 (a) Explain the V.I characteristics of a PN junction diode and show that PN diode works as a rectifier.
(b) Differentiate BJT and FET.
- Q.2 (a) With the help of characteristics curves and neat sketches explain the operation of the junction FET.
(b) What is Zener diode? Explain.
- Q.3 (a) What do you understand by feedback in amplifier? Explain it's types. Write two advantages and disadvantages of negative feedback.
(b) Draw Wien bridge oscillator and explain it's working.
- Q.4 (a) Explain working of L-C (Hartley Colpitts) oscillator.
(b) Explain power amplifier.
- Q.5 (a) Explain how transistor can be used as a switch. Also discuss it's switching characteristics.
(b) Write short note on bistable multivibrator.
- Q.6 (a) Explain the transfer characteristics of differential amplifier.
(b) Draw and explain free running multivibrator.
- Q.7 (a) Describe Schmitt trigger.
(b) Write short note instrumentation amplifier
- Q.8 Write a short notes:
i) Slew rate
ii) Operational amplifier
iii) Lag and Antilog amplifier
iv) Off-set voltage

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Digital Circuit & Design (CS222T)
Branch-CS

Time: 3:00 Hrs

Max Marks 70

- Note:**
- 1. Attempt any five questions.**
 - 2. Each question carries equal marks.**
 - 3. Assume suitable data if necessary & state them clearly.**

- Q.1 (a) Prove the following using De-Morgan's Theorem
 $(A+B)(C+D) = (A+B) + (C+D)$
(b) What do you understand by Universal Gate? Design all logic gates using NAND/NOR universal gates.
- Q.2 (a) Explain the construction of full adder using two half adder.
(b) Explain Multiplexer and Demultiplexer circuits.
- Q.3 (a) What is flip-flop? Explain working of R-S flip flop.
(b) What is Master-slave flip-flop? How race around condition is avoided in master-slave flip-flop?
- Q.4 (a) What is shift register? Explain serial in parallel out shift register.
(b) Draw a 5 bit ring counter using J-K Flip flop and explain its working.
- Q.5 (a) Draw and explain the VI characteristic of CMOS inverter.
(b) State and differentiate between ROM, PROM, EPROM, and EEPROM.
- Q.6 (a) Plot the following expression in K-Map and minimize them.
i) $ABCD + \overline{A}BC\overline{D} + A\overline{B}C + AB$
ii) $y = \sum m(7, 9, 10, 11, 12, 13, 14, 15)$
(b) Design a BCD adder using logic gates.
- Q.7 (a) Design MOD 6 counter using J K Flip flop.
(b) Compare RTL and DTL logic families.
- Q.8 Write a short note on-
i) Programmable Logic Array (PLA)
ii) Synchronous and asynchronous counter
iii) T- Flip Flop
iv) Encoder and Decoder

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Data Structure-II (CS223T)
Branch-CS

Time: 3:00 Hrs

Max Marks 70

Note : (i) Attempt any five questions.

(ii) Answer should be precise & to be point only.

(iii) Assume suitable data if necessary & state them clearly.

Q.1 (a) What is data structure? Difference between primitive and non-primitive data structure.

(b) Distinguish between static and dynamic memory allocation.

Q.2 (a) Distinguish between LIFO and FIFO.

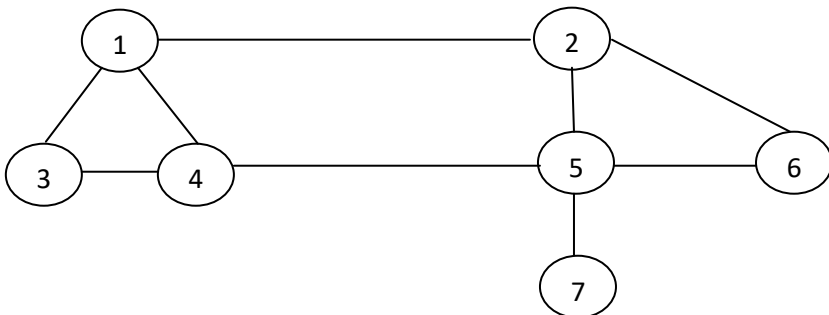
(b) Write a program to print Fibonacci series using recursion.

Q.3 (a) What is a circular queue? How do you represent it?

(b) Write a program to perform insertion and deletion operation in the queue using static implementation.

Q.4 (a) Draw a graph with five vertices each of degree 4.

(b) Find the degree of each vertex of the graph given below:



- Q.5 Define the following-**
- (a) Strictly binary tree.**
 - (b) Completely binary tree.**
- Q.6 Write an algorithm to insert a number in the linked list at the following position:**
- (i) In the beginning at the list.**
 - (ii) After a specified element.**
 - (iii) Before a specified element.**
 - (iv) At the end of the list.**
- Q.7 Write a program for insertion sorting.**
- OR**
- Write a program for selection sorting.**

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Discrete Structure (CS224T)
Branch : CS

Time: 3:00 Hrs**Max Marks 70**

- Note :**
1. Attempt any Five questions out of Eight.
 2. Answer should be precise & to be point only.
 3. Assume suitable data if necessary & state them clearly

- Q.1** (a) Define Partial Order Relation with example. 7
 (b) If R is an equivalence relation in the set A then Prove that R^{-1} is an equivalence relation in the set A. 7
- Q.2** (a) Let G be a simple graph with n vertices. If G has K components then show that the maximum number of edges that G can have are $\frac{(n-k)(n-k+1)}{2}$ 7
 (b) Let a, b, c be elements in a lattice (L, \leq) . 7
 Show that if $a \leq b$, then $a \vee (b \wedge c) \leq b \wedge (a \vee c)$
- Q.3** (a) What is tautology? Hence show that $P \rightarrow Q \leftrightarrow (\sim P \vee Q)$ is a tautology. 7
 (b) Obtain the principle disjunctive and conjunctive normal forms of $P \rightarrow [(P \rightarrow Q) \wedge \sim (\sim Q \vee \sim P)]$. 7
- Q.4** (a) Define semi groups, Monodies and Groups with example. 7
 (b) Define field & show that field F does not have a nonzero zero divisor. 7
- Q.5** (a) Show that if n is a positive integer, then 7
 $1 + 2 + \dots + n = \frac{n(n+1)}{2}$
 (b) State and prove the Pigeonhole Principle. 7

- Q.6 (a) Find the homogeneous solution of the following difference equation. 7

$$4a_r - 20a_{r-1} + 17a_{r-2} - 4a_{r-3} = 0$$

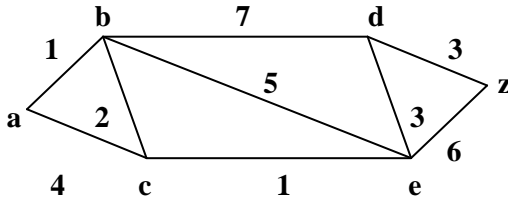
 (b) Solve the recurrence relation. 7

$$9a_r - 6a_{r-1} + a_{r-2} = 0$$

 Given that $a_0 = 0$ and $a_1 = 1$

- Q.7 (a) State the Binomial theorem. What is the expansion of $(x+y)^4$? 7
 (b) Define Homeomorphisms and Isomorphism of a group, with example. 7

- Q.8 (a) Find the shortest path from a to z in the graph shown in Fig., where numbers associated with the edges are the weights. 7



- (b) Define Hamiltonian Paths and Circuits. 7

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Communication Skills (HU220T)
Branch-CE/EE/EC/CS/IT/ME

Time: 3:00 Hrs

Max Marks 70

- Note :** (i) Attempt any five questions. All questions carry equal marks.
(ii) Answer should be precise & to the point only.
(iii) Assume suitable data if necessary & state them clearly

- Q.1** (a) What is communication? Explain importance of communication in detail?
(b) What are different barriers to communication and how will you eliminate them?
- Q.2** (a) How are non-verbal communication in an online environment?
(b) What do you mean by communication styles? Explain.
- Q.3** (a) Define cycle of communication. Discuss the role of feedback in the cycle of communication.
(b) What do you mean by encoding & decoding of the message? What is the role of source and receiver in communication?
- Q.4** (a) What are some examples of non-verbal signals that we convey in communication with other peoples?
(b) What is the importance of studying non-verbal communication?
- Q.5** (a) Discuss the level of communication.
(b) What are the different challenges in communication?

- Q.6** (a) What is paralinguistic features of communication.
(b) What is volume in paralinguistics?
- Q.7** (a) What is proxemics in non-verbal communication?
(b) Discuss the features importance to make an oral presentation effective.
- Q.8** Write short notes on- **(Marks=14)**
(a) Feedback
(b) Semantic barriers
(c) Voice modulation
(d) Gesture.

Bachelor of Engineering
Third Semester Main Examination, Dec-2020
Mathematics-III [MA-220]
Branch-EE/EC/CS/IT

Time: 3:00 Hrs**Max Marks 70****Note : Attempt any five questions.****All question carry equal marks.**

- Q.1 (a) State and prove Cauchy's theorem.
 (b) Show that the function $e^x(\cos y + i\sin y)$ is analytic and find its derivative.
- Q.2 (a) Using Cauchy's integral formula prove that : $\int_C \frac{e^{2z}}{(z+1)^4} dz = \frac{8\pi e^{-2}}{3} i$, where C is the circle $|z| = 3$.
 (b) Find the imaginary part of the analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2$.
- Q.3 (a) Find the real root of the equations $x^3 - 9x + 1 = 0$ by the method of false position.
 (b) Apply Newton Raphson method to solve $3x = \cos x + 1$.
- Q.4 (a) Using Newton's forward Interpolation formula, find the value of $f(1.6)$,if
 $x: \quad 1 \quad 1.4 \quad 1.8 \quad 2.2$
 $y: \quad 3.49 \quad 4.82 \quad 5.96 \quad 6.5$
 (b) Solve the following system by Gauss elimination method
 $6x_1 + 3x_2 + 2x_3 = 6$
 $6x_1 + 4x_2 + 3x_3 = 0$
 $20x_1 + 15x_2 + 12x_3 = 0$
- Q.5 (a) Apply Lagrange's formula to find the value of x when $f(x) = 0$ given that
 $x: \quad 30 \quad 34 \quad 38 \quad 42$
 $f(x): \quad -30 \quad -13 \quad 3 \quad 18$
 (b) Solve initial value problem $\frac{dy}{dx} = 1 + xy^2$, $y(0)=1$ for $x = 0.4, 0.5$ by using Milne's method when it is given that
 $x: \quad 0.1 \quad 0.2 \quad 0.3$
 $y: \quad 1.105 \quad 1.223 \quad 1.355$

Q.6 (a) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition $y(0) = 1$ by Runge kutta rule from $x = 0$ to $x = 0.4$ with $h = 0.1$

(b) Evaluate $\int_{0.5}^{0.7} x^{1/2} e^{-x} dx$ approximately by using a suitable formula.

Q.7 (a) Solve the following by Euler's modified method, the equation $\frac{dy}{dx} + \log(x + y)$, $y(0) = 2$ at $x = 1.2$ and 1.4 with $h = 0.2$

(b) Use picard's method to approximate y when $x = 0.2$ given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = x - y$

Q.8 (a) Find the z Transform of Sinak, k7,0

(b) Solve the following by Gauss Seidel iteration Method

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$2x + 2y + 10z = 14$$